On a Collection of Blattidæ preserved in Amber, from Prussia.

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(Plates 47 & 48.)

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In 1907 Dr. R. Klebs, of Königsberg-i.-Pr., sent to me for study the major part of his fine collection of Blattidæ enclosed in amber, and this spring I received from him the remainder. As practically nothing has been written on the Blattidæ of the amber-deposits since the appearance of the great memoir "Die im Bernstein befindlichen Hemipteren und Orthopteren der Vorwelt" * by Germar and Berendt in 1856, and as only 5 species of Blattidæ were described in that work, it is not surprising that a study of Dr. Klebs's large collection of these insects enables me to add considerably to our knowledge of the fauna that flourished in the Oligocene forests of East Prussia. I am greatly indebted to my kind correspondent for the opportunity he has afforded me of examining a collection unequalled in interest and wealth of material.

All the specimens come from the well-known amber-deposits in the Baltic provinces of East Prussia; the deposits are of Lower Oligocene age and correspond to the Headon beds in the Isle of Wight. As has long been recognised, the insect-fauna of the amber-deposits differs in no very striking features from a characteristic tropical or subtropical fauna of the present day, and the Blattidæ which I have examined, belonging to 9 genera and 24 species, present no details of structure or form which we can regard as peculiarly primitive and archaic. I have not found it necessary to erect a single new genus for the reception of any amber-enclosed species, for all are plainly referable to genera which flourish to-day in the tropical belt. The chief interest of the collection lies in the comparison which it is possible to make between the occurrence of certain genera in the amber-deposits and their geographical distribution at the present time. The following are the genera of Blattidæ occurring in the amber-deposits :—

Ectobius.
Ischnoptera.
Phyllodromia.
Ceratinoptera.
Temnopteryx.
? *Nyctibora* (larval form only).
Periplaneta.
? *Polyphaga* (larval form only).
Holocompsa.

* This is Bd. ii. Abt. 1 of the memoir 'Organische Reste im Bernstein,' the first volume having appeared in 1845.

Of these genera, *Ectobius* at the present day is confined to Europe and tropical Africa * ; *Ischnoptera*, *Phyllodromia*, *Ceratinoptera*, and *Temnopteryx* occur in all the tropical regions, in Australia, and in the southern half of the Nearctic region ; *Nyctibora* is a characteristic Neotropical genus ; *Periplaneta*, if we exclude the cosmopolitan species distributed by the agency of man, is a tropical and subtropical genus ; *Polyphaga* is found in the southern and extreme eastern parts of the Palæarctic region, in Africa, and sporadically in the Oriental region ; *Holocompsa* is Neotropical, Ethiopian, and Oriental in its distribution. It must be remembered that the species of cockroaches preserved in amber are, with one exception, of small or moderate dimensions ; there are none rivalling in size the species of *Blabera* from S. America, or of *Nauphoëta* from tropical Africa. Large robust species if entrapped in the sticky resin exuding from the trees of the Oligocene forest would be able to break away and escape the doom that awaited more fragile species. That species of considerable size did exist side by side with smaller forms is indicated by the presence in Dr. Klebs's collection of a large larval moult which I refer with some little doubt to the genus *Nyctibora* ; judging from the general appearance of this specimen, I do not consider it to be a final moult, and there is every reason to suppose that the adult was not inferior in size to modern representatives of the genus. There can be little doubt that if the larger species of the amber fauna had been preserved they would have supplied additional evidence of its affinities with a modern tropical fauna.

A comparison of the amber-enclosed Blattidæ with the paucity of species occurring in Northern Europe at the present day is sufficiently indicative of the profound change of climate that has ensued within geologically-recent times. Of the 9 genera found in the amber fauna, only one † has persisted in N. Europe to the present day ; and that one is *Ectobius*, represented in the amber fauna by two species, in modern times by three N. European forms. At one time I was inclined to regard the two Oligocene species as a purely Palæarctic element in a tropical fauna and was puzzled to find a reasonable explanation of their presence. But since then I have examined a good many collections of Blattidæ from tropical Africa and there is no doubt that the genus *Ectobius* is well represented on that continent, though all but one of the species are undescribed. It is clear, then, that *Ectobius* is not purely a genus of temperate or subarctic regions and its presence in the amber fauna is not a matter for very great surprise. At the same time the two species of the amber fauna appear to be more closely related to the well-known

* I have recently had the opportunity of examining the types or co-types of species from Australia and New Zealand which have been referred to *Ectobius* ; not one of these belongs even to the subfamily *Ectobiinæ*.

† *Phyllodromia germanica* is not included ; it is a cosmopolitan species whose centre of dispersal is not known.

Ectobius lapponicus than to any other recent member of the genus, and it is tempting to suppose that the modern species is a direct descendant of one of the amber-enclosed forms. If this is so, we may perhaps continue our speculations and assume that whilst the onset of more rigorous conditions of climate eventually drove southwards the great bulk of the cockroaches of the amber fauna, two species of *Ectobius* held their ground and one of these has persisted with subsequent small modifications of structure until the present day. That the climate of N. Europe during the Glacial Epoch was of such severity that animal life was rendered impossible is, in the light of modern researches, extremely unlikely *, and there is nothing inherently improbable in the view that an insect could persist in one area from Oligocene to recent times with only slight changes in structure.

The unique specimen which I refer to the genus *Holocompsa* is most nearly allied to *H. minutissima*, de Geer, originally described from Surinam; but this and the two *Ectobii* are the only species which I can compare with any confidence with modern species, and in view of the almost world-wide distribution of the genera represented in the amber-deposits by adult forms it would be most hazardous to attempt to compare this fauna with any particular tropical fauna of to-day. Yet if I am right in determining a single damaged moult as belonging to a species of *Nyctibora*, we have, in conjunction with the undoubted affinities of the single species of *Holocompsa*, slight indications of a remote connection between the modern Neotropical fauna and the amber fauna, for the entire subfamily *Nyctiborinæ* is now confined to the Neotropical region of the world.

A few remarks may be made on the condition of the specimens which I have handled. The great majority are in a most admirable state of preservation and with a high-power simple lens it is generally possible to make out nearly all the details of their structure without great difficulty. When I reflect on the enormous antiquity of these absolutely perfect specimens I cannot refrain from expressing a hope that some method will shortly be devised for enshrining in a similar way in balsam or other resin the type-specimens of recent species of insects. As the science of entomology advances the importance of the type-specimen ever increases; unfortunately the ravages of mites, *Anthreni*, dust, mould, and careless students are often disastrous, and we bemoan to-day the irreparable loss of specimens that would afford valuable clues to hopeless tangles of synonymy. It is sad, but none the less true, that it is possible to make out more of the external anatomy of the Oligocene *Ectobius balticus* from an examination of specimens many thousands of years old, than of the recent *Ectobius lapponicus* from an examination of Linnæus's type, the shattered wreck of which is preserved in the cabinets of this Society.

* *Cf.* Scharff: 'The History of the European Fauna,' 1899.

Some of the amber-enclosed specimens are coated with an opaque whitish deposit, due probably to a mixture of body-juices or of water with the resin in contact with the enclosed insect's body. A few of the insects struggled violently when first entrapped, as shown by the wavy and disturbed appearance of the amber, and this obscures the structural details which it is important for classification's sake to make out.

I have not figured many of the species *in toto*, as I do not consider such illustrations of very great value. The species of *Phyllodromia* and *Ischnoptera*, both fossil and recent, present such a uniform appearance that a careful examination of details of wing and tegminal venation, of leg-armature, and of the form of the terminal abdominal segments is necessary to discriminate between the numerous forms; it is these details that I have figured wherever necessary.

I have succeeded in identifying all the species described by Germar and Berendt, but not those few described by authors who wrote before 1856, and I do not know where the types of these species are preserved.

Handlirsch in 'Die Fossilen Insekten,' 1906–1908, pp. 694–695, gives a complete list of all the species described from amber-*inclusa*, with references to the literature.

The numbers quoted under each species are those which Dr. Klebs's specimens bear; a glance at them indicates the relative abundance of the species. Numbers in italics signify type-specimens.

Subfam. Ectobiinæ.

Ectobius balticus, *Germ. & Ber.* (Pl. 47. fig. 1.)

Blatta baltica, Germar & Berendt, Organ. Reste im Bernstein, Bd. ii. Abt. 1, p. 34, pl. 4. fig. 5 (1856).

♂ ♂. Nos. 5428, 5429, 5436, 5439, 5465, 5468, 5470, 5474, 5480, 5487, 5493, 5496, 5503, 5513, 5521, 5527, 5542, 5554, 5556, 6705, 6723, 6726, 6734, 7478, *a* 1.

♀ ♀. Nos. 5440, 5457, 5475, 5557, 5560, 6719.

The species resembles *E. lapponicus*, Linn., in its coloration, the venation of the tegmina, and the form of the apex of the abdomen. It is distinguished by its smaller size, by the long tegmina and wings of the female, and by the short acuminate genital style of the male. The single genital style in *E. lapponicus* is broad and rounded, and a microscopical examination shows that its apex is furnished on the dorsal side with a tuft of hairs; in *E. balticus* the style is like a small pin-point. Three undoubted female examples show that *E. balticus* differs from all the modern European species in the greater length of the tegmina and wings, these slightly surpassing the apex of the

abdomen. The subgenital lamina of the female is semiorbicular, ample, and with the posterior margin slightly sinuate.

A slight variation in the coloration of the pronotum is exhibited by some specimens (Nos. 5428, 5436, 5474, 5503) ; in these the disc of the pronotum is divided by a pale central line, which at the base divides into two, and two short lines may or may not be given off from the limbs of the bifurcation. In No. 5436 the "titillator penis" is extended, its shape is as in *E. lapponicus*. The species average 9 mm. in length ; the females are slightly shorter and broader than the males.

Ectobius inclusus, sp. n. (Pl. **47**. fig. 2.)

♂ ♂. Nos. *5469*, 5531 (adults), 5530 (larva).
♀ ♀. Nos. *5437*, 5543.

Allied to *E. balticus*, Germ. & Ber., but the disc of the pronotum testaceous, with numerous castaneous dots (? punctures) and lines more or less symmetrically arranged. Sub-genital lamina (♂) rather more elongate and furnished with one long and sharply pointed style. ♀. Shorter and broader, with tegmina and wings exceeding apex of abdomen ; sub-genital lamina semi-orbicular, ample, posterior margin sinuate. Femora very sparsely armed.

Total length (♂) 9 mm. ; (♀) 8·8 mm.

In No. 5437 the tegmina are slightly parted, revealing the apex of the wing, the venation of which, so far as it can be seen, conforms to the arrangement characteristic of the genus. In the larva (No. 5530) the posterior angles of the meso- and metanotum are backwardly produced, as in all Blattid larvæ of winged species. The genital style of the male is highly characteristic of the species.

Subfam. Phyllodromiinæ.

Ischnoptera gedanensis, *Germ. & Ber.* (Pl. **47**. fig. 3.)

Ischnoptera gedanensis, Germar & Berendt, t. c. p. 33, pl. 4. fig. 4 (1856).

♂ ♂. Nos. 5455, 5462, 5484, 5562, 6702, 6706, 6709, 6715, 6717, 6722, & 4.
♀. No. 6712.

Since the wings are completely concealed in all the examples which have been examined, it is impossible to be absolutely certain if this species really belongs to the genus *Ischnoptera* ; but as the insect in its general facies bears a very close resemblance to certain modern species of *Ischnoptera*, I refer the fossil form to that genus without much hesitation. The published description of the species is fairly complete and the following details only need to be added to it :—Tegmina with mediastinal vein simple or with one short branch, radial vein bifurcate and ramose at apex, 15–17 costals, 9–10 longitudinal discoidal sectors connected with each other by numerous transverse

venulæ. Anal field rather elongate and narrow, anal vein near its apex curved sharply inwards to the sutural margin. Front femora on anterior margin beneath with 4–5 stout spines, succeeded distally by numerous closer set and smaller spines; two spines on the posterior margin near the apex. Mid- and hind-femora with 4–5 long spines on both margins beneath. Genicular spines long. Formula of apical spines $\frac{1}{1}, \frac{1}{1}, \frac{1}{1}$. Sub-genital lamina almost symmetrical, posterior margin bisinuate ; the styles short, situated in the sinuations. Cerci moderate, with 9 visible joints.

♀. Similar to ♂, but shorter and rather more robust ; sub-genital lamina semi-orbicular, ample. Total length (♂ & ♀) 18 mm.

One example (6722) is a mere fragment, only the pronotum, tegmina, wings, and one leg remaining, the rest having probably been devoured by some predaceous insect.

Ischnoptera klebsi, sp. n. (Pl. 47. fig. 4.)

♂ ♂. Nos. *5450*, 5481, 6701.

♂. Allied to *I. gedanensis*, Germ. & Ber. Antennæ considerably longer than the body and tegmina. Eyes rather wide apart. Pronotum trapezoidal, anteriorly subtruncate, freely exposing the vertex of the head, posteriorly most obtusely angled, sides deflexed, disc with two oblique and shallow impressions. Tegmina and wings exceeding the apex of the abdomen. Venation of tegmina and armature of femora as in *I. gedanensis*. Sub-genital lamina hirsute, almost symmetrical, and with a pair of stout, short hirsute styles, placed close together near the middle, the right style a little stouter than the left and with some strong short setæ near its apex. Cerci 10-jointed, sub-fusiform, not surpassing the apex of the tegmina.

Total length 18 mm.

This species is undoubtedly very close to *I. gedanensis*, but the different form of the sub-genital lamina and styles serves to distinguish it.

Ischnoptera perplexa, sp. n. (Pl. 47. fig. 5.)

♂ ♂. Nos. *5473*, 5491. ♀. No. *5477*.

♂. Closely allied to the two preceding species, but smaller than either. Sub-genital lamina as in *I. klebsi*, but more hirsute, and the styles shorter, their dorsal surface furnished with very stout setæ.

♀. Similar to ♂ ; sub-genital lamina ample, semi-orbicular ; cerci stouter ; tegmina shorter.

Total length (♂) 14·5–15·8 mm. ; (♀) 13–15·8 mm.

It is very difficult to separate these three closely allied species from one another from an examination of the tegminal venation and ventral surface

alone; it is more than likely that important differences are presented by the secondary sexual characters, such as gland-openings, occurring on the dorsal surface, and by the form of the supra-anal lamina; but since these are not visible in the specimens before me I have relied on the slight differences in the form of the sub-genital laminæ and styles and in the size.

Phyllodromia lorenz-meyeri, sp. n.* (Pl. 47. figs. 6, 17.)

♂ ♂. Nos. 5432, 5445, 5447, 5456, 5458, 5460, 5476, 5495, *5497*, 5501, 5502, 5505, 5508, 5537, 5538, 5549, 5561, 6714.

♀ ♀. Nos. *5504*, 5555, 6724, 6732, 6704, larvæ Nos. 5486, 6711.

♂. Dark castaneous. Vertex of head not covered by pronotum. Eyes wide apart. Antennæ not exceeding the apex of tegmina. Pronotum trapezoidal, posteriorly truncate, exposing the scutellum, lateral margins hyaline, but the hyaline not extending to postero-lateral angles which are concolorous with disc. Tegmina exceeding the apex of the abdomen, lateral margins narrowly hyaline; mediastinal and radial veins simple, 10–12 costals, discoidal field strongly reticulated, anal vein well-marked. Sub-genital lamina sub-trapezoidal, symmetrical, posterior margin slightly notched in the middle, styles minute, situated in small notches. Cerci pointed, 13-jointed, not exceeding apex of tegmina. Titillator strongly hooked, apex rounded. Front femora on anterior margin beneath with 4 spines, succeeded distally by piliform spines, 3–4 spines on posterior margin; remaining femora with 4–5 spines on anterior margin beneath, 3–4 spines on posterior margin. Metatarsus much longer than remaining joints.

♀. Shorter and broader, tegmina barely exceeding apex of abdomen; hyaline margins of pronotum broader; sub-genital lamina ample, produced, apex notched. Cerci stouter.

Length (♂) 10·5–14·5 mm.; (♀) 12 mm.

None of the specimens are in a very good state of preservation and it is not easy to make out the details of structure in them, the difficulty being increased by the dark colour of the species. The incomplete hyaline lateral margins of the pronotum afford the most obvious character whereby to recognize the species. There is considerable variation in size, and it is a little difficult at first to believe that the smallest example is specifically identical with the largest; but even after the most careful examination I am unable to find any character on which to separate the small specimens from the large. It is possible that the wing-venation or the structure of the supra-anal lamina might present discriminating characters, but as they are not visible in any of the specimens before me I have no option but to regard the

* Named in honour of my friend Herr Ed. L. Lorenz-Meyer, who has done so much to enrich the collections of the Hope Department, Oxford University Museum.

whole series of examples as representatives of one species. No. 5432 is not in a good state of preservation and is referred, with considerable doubt, to this species.

Phyllodromia germari, sp. n. (Pl. 47. figs. 7, 8, 18.)

♂ ♂. Nos. 5433, 5441, *5444*, 5483, 5494, 5498, 5509, 5515, 5545, 5547, 5551, 5558, 6713, 6721.

♀ ♀. Nos. 5482, 5500, 5520, *5544*.

Larvæ. Nos. 5446, 5463, 5482, 5525, 5528, 5533, 5534.

♂ ♀. Testaceous, with a symmetrical piceous or castaneous pattern on the disc of the pronotum. Head piceous, vertex pale, a transverse pale band at base of the clypeus, mouth-parts pale. Antennæ longer than body and tegmina. Eyes wide apart. Pronotum trapezoidal, anteriorly not covering the vertex of the head, sides not deflexed, lateral margins hyaline. Scutellum exposed. Tegmina and wings exceeding the apex of the abdomen, of equal length in both sexes. Veins of tegmina paler than the ground-colour, which in well-preserved examples appears to be pale castaneous ; mediastinal and radial veins simple, marginal area broad, 11 costals, anterior ulnar 6-ramose, posterior ulnar simple, 5–6 axillaries. Sub-genital lamina (♂) produced, slightly asymmetrical, the apex forming an obtuse lobe, a stout style situated in a notch on the left of this lobe, a small slender style on the right ; (♀) large, strongly produced, apex emarginate. Cerci slender, pointed, not exceeding the apex of the tegmina, of 13 joints, the two apical joints minute. Front femora armed on anterior margin beneath with 4–5 spines, succeeded distally by piliform spines, on posterior margin 2–3 spines ; mid-femora with 3–4 spines on anterior margin beneath, 5 spines on posterior margin ; hind-femora with 2–3 spines on anterior margin, 4 on posterior margin. Formula of apical spines $\frac{2}{1}, \frac{1}{1}, \frac{1}{1}$.

Total length (♂) 12·5–14 mm. ; (♀) 11–12·5 mm.

Some larval forms that I refer without much doubt to this species have the mesonotum, metanotum, and abdominal tergites heavily blotched with castaneous ; the supra-anal lamina is trigonal. In one specimen (5534) the dorsal integument has been ruptured, and from the rent protrudes a portion of the alimentary canal.

Phyllodromia yolanda, sp. n. (Pl. 47. fig. 9.)

♂. No. *5523*.

Piceous. (Antennæ mutilated.) Vertex of head not covered by the pronotum. Pronotum trapezoidal, posteriorly truncate, exposing the scutellum, margined all round with testaceous, broadly on the lateral margins, narrowly on the anterior and posterior margins. Tegmina short, barely exceeding the

apex of the abdomen, their apices obtusely rounded, laterally margined with testaceous ; 14 costals ; discoidal sectors numerous, almost longitudinal, discoidal field reticulated, anal field elongate, more than one-third of total length of tegmina. Sub-genital lamina produced, asymmetrical, both styles, which are strongly chitinized, situated on the left side, the right style stout and bifurcate, the left style more slender, acuminate, and with a minute tooth near its base. Titillator nearly straight, acuminate. Cerci slender, exceeding the apex of tegmina, with 11 visible joints. Legs testaceous. Front femora armed with a complete row of spines on the anterior margin beneath, posterior margin sparsely armed.

Total length 12·5 mm.

Distinguished by the long anal field of the tegmina, the pronotum margined all round with testaceous, and the bifurcate style.

Phyllodromia antiqua, sp. n. (Pl. 47. figs. 10, 16.)

♂. Nos. *5548* (adult), 5522 (larva).

Dark castaneous. Head piceous, antennæ longer than total length ; vertex not covered by the pronotum. Pronotum trapezoidal, posteriorly sub-truncate, lateral margins hyaline and extending inwards at the postero-lateral angles. Tegmina rather broad, not exceeding the apex of the abdomen by much ; marginal field broad, venation conforming to usual Phyllodromiine type, about 11 costals. Sub-genital lamina sub-trapezoidal, asymmetrical, the right style situated in the middle line and shorter than the left style. Cerci moderate, not exceeding the apex of the tegmina, with 11 visible joints. Front femora with a complete row of stout spines on anterior margin beneath, 3 spines on posterior margin ; mid- and hind-femora with 4–5 spines on anterior margin, 5 spines on posterior margin beneath, the latter longer than the former. Formula of apical spines $\frac{2}{1}, \frac{1}{1}, \frac{1}{1}$. No genicular spine on front femora.

Total length 15·9 mm.

In a small larva which I refer to this form the mesonotum is laterally bordered with testaceous, and the metanotum is entirely testaceous, except for a narrow piceous line along the anterior border.

Phyllodromia latissima, sp. n. (Pl. 47. fig. 11.)

♂. No. *5507*.

♀. Nos. *6703* (adult), 5540 (larval moult).

Broad, depressed, castaneous. Antennæ equal to total length. Vertex of head not covered by pronotum. Pronotum trapezoidal, lateral margins hyaline. Tegmina sub-ovate, not exceeding by much the apex of the abdomen ; marginal field broad, hyaline, 15–16 costals, discoidal sectors numerous,

colique. Wings broad, semi-coriaceous. Sub-genital lamina (♂) sub-trapezoidal, a pair of long styles situated in deep notches; (♀) semi-orbicular, ample. Cerci rather short, stout, fusiform, apex blunt, 9-jointed. Legs piceous, coxæ edged with testaceous. Front femora with a complete row of strong spines on the anterior margin beneath, 2–3 spines on posterior margin; mid- and hind-femora with 4–5 spines on both margins beneath. Genicular spines well developed. Formula of apical spines $\frac{1}{1}, \frac{1}{1}, \frac{1}{1}$.

Total length 16·5–18 mm.

The species shows some affinities to the genus *Liosilpha*, Stål, and belongs to a section of the genus *Phyllodromia*, which will perhaps be raised eventually to distinct generic rank.

Phyllodromia tenacula, sp. n. (Pl. 47. fig. 12.)

♂ ♂: Nos. *5519*, 6708.

Piceous. Vertex of head not covered by pronotum. Antennæ setaceous, longer than the body. Pronotum trapezoidal, lateral margins hyaline. Tegmina considerably exceeding the apex of the abdomen, mediastinal field hyaline; 16 costal veins, anal vein impressed; anal field moderately long. Sub-genital lamina produced, asymmetrical; right style short, stout, and beset with minute acuminate tubercles, left style slender. Cerci slender, with 12 visible joints, not exceeding apex of tegmina. Front femora with a complete row of strong spines on anterior margin beneath, 3 spines on posterior margin; mid- and hind-femora with 4 to 5 spines on both margins beneath. Formula of apical spines $\frac{2}{1}, \frac{1}{1}, \frac{1}{1}$; no genicular spines on anterior femora.

Total length 14·5 mm.; length of tegmina 11 mm.

Phyllodromia klebsi, sp. n. (Pl. 47. fig. 15.)

♂. No. *α 2*.

Dark castaneous. Vertex of head almost covered by the pronotum, with 3 testaceous stripes. Pronotum trapezoidal, sides broadly hyaline. Tegmina and wings rather ample, extending considerably beyond the apex of the abdomen; tegmina with mediastinal area ample; about 14 costals, the last 2 or 3 ramose. Supra-anal lamina asymmetrical, posterior margin widely notched in the middle, 2 short teeth on the left side of this notch. Sub-genital lamina asymmetrical, with 2 slender styles, the left style straight and situated at the posterior angle of the plate, the right style sinuate and situated in a notch a little to the right of the middle line of the plate. Cerci moderate, blunt, with 9 visible joints. Front femora with a complete row of spines on anterior margin beneath, 3 on the posterior margin; mid- and hind-femora with 4–5 long spines on both margins beneath.

Total length 18 mm.

The apex of the abdomen in the unique specimen is somewhat obscured by clouding of the amber and by enclosed foreign particles, but I trust that I have succeeded in making out the details of structure successfully. Asymmetry of the supra-anal lamina in the Blattidæ is unusual, but by no means unknown (cf. *Anisopygia jucunda*, Sauss.); where it occurs it serves to mark a species very distinctly.

Phyllodromia furcifera, sp. n. (Pl. 47. fig. 13.)

♂. No. *5539*. ♀. No. *6740*.

Piceous. Antennæ longer than total length. Pronotum trapezoidal, without pale margins. Tegmina rather narrow, not exceeding the apex of abdomen by much, outer margins not pale. Sub-genital lamina (♂) produced, asymmetrical; both styles, which are strongly chitinized, situated on the left side, the left style is slender and sharply pointed, the right style is larger, stouter, and bifurcate; (♀) semiorbicular, ample. Cerci slender, with 12 visible joints, exceeding apex of tegmina. Front femora with a complete row of spines on anterior margin beneath, 4 spines on posterior margin; mid- and hind-femora with 4–5 spines on both margins beneath. Formula of apical spines $\frac{2}{1}$, $\frac{1}{1}$, $\frac{1}{1}$; no genicular spine on front femora.

Total length (♂ & ♀) 16 mm.

The genital styles are remarkable, and I know of no recent species of the genus with styles at all like them; they recall, however, the genital styles of some W. African species of *Stylopyga* recently described by me.

Phyllodromia baltica, sp. n. (Pl. 47. fig. 14.)

♂. No. *5479*.

Dark castaneous. Antennæ longer than total length. Vertex of head not covered by pronotum. Pronotum trapezoidal, posteriorly very obtusely produced, lateral margins not hyaline. Tegmina not exceeding the apex of abdomen by much, about 12 costals; discoidal sectors oblique, numerous; anal vein well marked. Sub-genital lamina produced and very asymmetrical; two slender styles, the left slightly stouter than the right. Cerci rather stout, exceeding the apex of the tegmina, with only 9 visible joints, the apical joint rather large. Front femora with a complete row of spines on the anterior margin beneath, 3–4 spines on the posterior margin; mid- and hind-femora with 6 spines on anterior margin, 5 on posterior margin, beneath. Formula of apical spines $\frac{1}{1}$, $\frac{1}{1}$, $\frac{1}{1}$; genicular spines on all the femora.

Total length 13 mm.

Distinguished by the great asymmetry of the sub-genital lamina and by the stout cerci.

PHYLLODROMIA PRISTINA, sp. n. (Pl. 47. fig. 19.)

No. *5451*.

Piceous. Vertex of head not covered by pronotum. Pronotum trapezoidal, posteriorly truncate, exposing the scutellum, laterally broadly hyaline; at the postero-lateral angles the hyaline area is very broad and extends inwards irregularly towards the middle of the disc. Tegmina lanceolate, exceeding the apex of the abdomen, about 12 costals; discoidal sectors numerous, oblique; anal field rather elongate. Cerci moderately stout, exceeding the apex of the tegmina, with 12 visible joints.

Total length 11 mm.

The unique specimen is in a bad state of preservation and the sex cannot be determined, for the ventral scutes of the abdomen and the abdominal contents, as well as the legs, have disappeared. These injuries must have been caused prior to the inclusion of the insect in the amber, probably by some predatory insect, which, having devoured the more succulent portions of its prey, left the carcase to be overwhelmed later in a flow of resin. The pronotal pattern is the only character which I can employ to distinguish this species from its congeners. It is allied to *P. antiqua*, but is much smaller and darker.

As the species of *Phyllodromia* above described are only to be made out with some difficulty, I append the following key, which may render their determination easier. *P. pristina*, described from a single imperfect specimen, is omitted :—

1. Front femora armed on the anterior margin beneath with a few spines, succeeded distally by piliform spines.
   2. Dark castaneous; disc of pronotum unicolorous ..... *P. lorenz-meyeri.*
   2′. Testaceous; disc of pronotum with a fuscous pattern.... *P. germari.*
1′. Front femora armed on the anterior margin beneath with a complete row of strong spines.
   2. Pronotum with the lateral margins distinctly hyaline.
      3. Pronotum anteriorly and posteriorly with pale margins. *P. yolanda.*
      3′. Pronotum without pale anterior and posterior margins.
         4. Hyaline lateral margins extending inwards at the postero-lateral angles..... *P. antiqua.*
         4′. Hyaline lateral margins not extending inwards at the postero-lateral angles.
            5. Broad, depressed species ..... *P. latissima.*
            5′. Narrower species.
               6. Cerci slender, 12-jointed ..... *P. tenacula.*
               6′. Cerci short and obtuse, 9-jointed ..... *P. klebsi.*
   2′. Pronotum with the lateral margins not hyaline.
      3. Right genital style bifurcate at apex ..... *P. furcifera.*
      3′. Right genital style not bifurcate at apex ..... *P. baltica.*

One species of the group, No. 5563, I leave undescribed, for it is represented by a single specimen which is so damaged that the important details of its structure are not visible.

Ceratinoptera didyma, *Germ. & Ber.*

Blatta didyma, Germar & Berendt, t. c. p. 34, pl. 4. f. 6.
? *Blatta elliptica,* Giebel, Z. f. d. g. Nat. xx. (1862) p. 315.

♀ ♀. Nos. 5434, 5472.

Two females that correspond well with the description and figure of this species. The tegmina appear to be semi-corneous, and their venation on account of the clouding of the amber cannot be made out at all distinctly. The femora are sparsely armed ; the front femora have 3 spines in the middle of the anterior margin beneath, succeeded distally by piliform spines, there are about 4 spines on the posterior margin ; the mid- and hind-femora have 2–3 spines on the anterior margin beneath, 3–4 on the posterior margin. Sub-genital lamina ample and semi-orbicular. Cerci moderate, fusiform.

Total length 11 mm.

Ceratinoptera soror, sp. n.

♂. No. *7477*. ♀. No. *5901*.

Allied to *C. didyma*, Germ. & Ber., but larger and more stoutly built.

♂. Piceous, the pronotum bordered anteriorly and posteriorly with testaceous. Tegmina not exceeding the apex of the abdomen, venation more distinct than in *C. didyma,* mediastinal area broad, about 17 costals, anal vein impressed. Sub-genital lamina asymmetrical, similar to that of *Phyllodromia baltica* mihi, but with only one style, the left. Cerci stout, 9-jointed.

♀. Tegmina not extending beyond the 5th abdominal tergite, their apices sub-truncate. Apex of abdomen somewhat constricted ; supra-anal lamina transverse, surpassed by the sub-genital lamina, which is semi-orbicular and ample. Front femora armed on the anterior margin beneath with a complete row of stout spines ; mid- and hind-femora with 4–5 spines on the anterior margin, 5–6 on the posterior margin, beneath.

Length (♂) 10·5 mm., (♀) 11·1 mm. ; length of tegmina (♂) 8 mm., (♀) 5·1 mm.

Ceratinoptera cruenta, sp. n. (Pl. 48. fig. 20.)

♀. No. *5529*.

Light castaneous. Antennæ longer than total length. Pronotum trapezoidal, sides deflexed, posteriorly sub-truncate. Scutellum exposed. Tegmina not reaching to the apex of the abdomen, lanceolate, apparently semi-corneous, venation indistinct ; anal vein deeply impressed, not angulate. Abdomen broadly ovate ; sub-genital lamina semi-orbicular, ample. Front femora with piliform spines only on anterior margin beneath, posterior margin unarmed ; mid-femora with 3 spines on anterior margin beneath in the middle, none on posterior margin ; the left hind femur with one spine on

anterior margin and none on posterior margin beneath, the right hind-femur entirely unarmed. Formula of apical spines $\frac{2}{0}, \frac{1}{1}, \frac{1}{1}$; no genicular spines on front femora.

Total length 8 mm.

I know of no modern representative of the genus with so sparse a femoral armature. The apex of the abdomen is obscured by some foreign body, so that it is not possible to examine the cerci or the supra-anal lamina.

Ceratinoptera klebsi, sp. n.

♀. No. *6731*.

Testaceous, with a piceous pattern on the pronotum and the veins of the tegmina piceous. Pronotum trapezoidal, posteriorly truncate. Tegmina lanceolate, not extending beyond the 5th abdominal segment; mediastinal area large, marginal area broad, 4–5 costals, 3 longitudinal discoidal sectors, anal vein well marked, 3 axillaries. Supra-anal lamina produced, angles rounded, surpassed by the sub-genital lamina, which is large and sub-cucullate. Cerci moderate, with 7 visible joints. Front femora on anterior margin beneath with 4 strong spines, succeeded distally by minute piliform spines; remaining femora strongly armed. Formula of apical spines $\frac{2}{1}, \frac{1}{1}, \frac{1}{1}$

Total length 8·1 mm.; length of tegmina 4 mm.; pronotum 2·3 mm. × 2·6 mm.

The unique specimen is in a bad state of preservation, but in size it is intermediate between the other species of the genus, and is readily distinguishable from them by its coloration and markings.

Temnopteryx klebsi, sp. n.

♂. No. *5461*. ♀ ♀. Nos. 5449, *6710*.

Castaneous. Antennæ longer than the body. Vertex of head not covered by pronotum. Pronotum trapezoidal, posteriorly truncate, exposing the large scutellum in the ♂, lateral margins paler than the disc. Tegmina quadrate, not extending beyond the middle of the first abdominal tergite, their sutural margins touching, outer and inner posterior angles rounded, marginal field broader and paler than disc, venation obsolete, anal vein not visible. Abdomen in the ♂ not tapering, the last 4 segments somewhat constricted, supra-anal lamina trigonal, apex sub-truncate, sub-genital lamina produced and slightly asymmetrical with two (?) blunt styles. Abdomen of the ♀ ovate, supra-anal lamina trigonal, sub-genital lamina produced, ample. Cerci rather blunt, with 9 visible joints. Front femora with a complete row of strong spines on anterior margin, 3 spines in the distal half of the posterior margin, beneath; mid- and hind-femora with 6 spines on anterior margin,

4 spines on posterior margin, beneath; all the spines strong. Formula of apical spines $\frac{2}{1}$, $\frac{1}{1}$, $\frac{1}{1}$.

Total length (♂) 12·5 mm., (♀) 13 mm.; greatest breadth of abdomen (♂) 4·5 mm., (♀) 5 mm.; length of tegmina 3·5 mm.; pronotum 3·2 mm. × 4·5 mm.

The three specimens are not in a very good state of preservation, and the ventral aspect of the abdomen in the male is obscured at the apex.

Subfam. Nyctiborinæ.

?Nyctibora succinica, sp. n.

♀. No. *5425* (larva).

This is a larval moult in a bad state of preservation, there being a large hole in the dorsal surface. Professor Klebs informs me that the specimen was found under fragments of wood enclosed in amber, and that he has never seen any other specimen like it in all the collections of amber-*inclusa* that he has examined. The specimen, though immature, is far larger than any other species of cockroach known from the amber fauna, and the adult form must have rivalled in size the modern representatives of the genus. I have already given reasons to account for the absence of large species in the amber fauna, and need not repeat them again.

It is rarely possible to place with absolute certainty any larval cockroach in its correct genus, and the systematic position of this species is open to considerable doubt. The unique specimen has a peculiar polished sheen on the thoracic tergites, and this appearance is due, I believe, to the presence of a minute sericeous pile (such as is highly characteristic of the Nyctiborinæ), in which air is enclosed. Except at the margins of the tergites it is not possible to detect the individual hairs of the sericeous pile even with a high-power lens; but when an insect is imbedded in a substance, such as amber, with the same refractive index as air, many minute details of sculpture and pilosity are lost, and the latter can only be inferred to be present by the optical effect produced when mechanically combined with air particles. At first I was inclined to place the species in the subfamily Blattinæ, but as the specimen is a female and in the structure of the sub-genital lamina exhibits none of the groovings which in larval Blattinæ foreshadow the valvular nature of the adult sub-genital lamina, it is certain that my first identification was incorrect. In its structure and facies the specimen agrees well with the characters of the Nyctiborinæ.

The following is a description of the unique specimen:—

♀. Piceous, with a silvery sheen on the thoracic tergites. Head damaged and distorted. Antennæ setaceous. Pronotum anteriorly parabolic, posteriorly truncate, wider than long. Meso- and metanotum with the posterior

angles strongly produced backwards. Surface of the thoracic tergites punctate, of the anterior abdominal tergites striate, of the posterior abdominal tergites reticulate; the spaces between these points, striæ, and articulations silvery. Angle of the posterior abdominal tergites strongly produced backwards. Supra-anal lamina triangular. Cerci robust, 11-jointed. Subgenital lamina semi-orbicular, ample, posterior margin notched in the middle. Front femora with a complete row of short strong spines on the anterior margin beneath, other femora moderately armed, genicular spines long. Tibiæ stout, strongly armed, and with a sericeous pile. Tarsi with large pulvilli, metatarsi unarmed beneath, arolia large.

Length 21 mm.; pronotum 5·8 mm. × 10 mm.; mesonotum 3 mm. × 11·5 mm.

Subfam. Blattinæ.

Periplaneta succinica, sp. n.

♀. No. *5490*.

Rufo-castaneous. Antennæ fuscous at base, becoming rufous towards apex. Pronotum trapezoidal, not covering vertex of head, sides deflexed, posteriorly obtusely rounded. Tegmina semicorneous, extending to the antepenultimate abdominal tergite; 10 costals, the last 4 being ramose; discoidal sectors multiramose, some of the rami extending to the apex of the tegmen and also on to apex of marginal field; anal vein impressed, strongly bowed; surface of tegmina, especially in discoidal and anal fields, densely reticulated. Supra-anal lamina trigonal, sub-cucullate, apex emarginate. Sub-genital valves of the form typical of this subfamily. Cerci rather short, blunt, with 8 visible joints. Front femora with a complete row of strong spines on anterior margin beneath, only 1 on the posterior margin; mid- and hind-femora with 5 spines on both margins beneath, those on the posterior margin the longer. Genicular spines strong. Posterior metatarsus equal in length to the succeeding joints; pulvilli minute, apical.

Total length 18 mm.; length of tegmina 12 mm.

This is a beautifully preserved specimen, and there can be no doubt as to the correct systematic position of the species.

Subfam. Corydiinæ.

Polyphaga fossilis, sp. n. (Pl. 48. fig. 21.)

♂. No. *5489* (larva).

Ovate. Rufous with recumbent pubescence. Vertex of head not covered by pronotum. Eyes wide apart, not markedly reduced in size. Antennæ short, moniliform in apical half; second and third joints sub-equal, twice as long as fourth joint. Pronotum anteriorly arcuate, posteriorly truncate, sides strongly deflexed. Posterior angles of meso- and metanotum slightly produced

backwards. Supra-anal lamina transverse with arcuate posterior margin. Cerci short, slenderly acuminate. Sub-genital lamina symmetrical, with two slender hirsute styles. Tibiæ short, equal to half the length of the femora; front tibiæ with 4 apical spines and 1 spine on the outer margin; mid-tibiæ with 5 apical spines, 2 on the inner margin near the apex and 4 on the outer margin; hind-tibiæ with 4 apical spines, 4 on the inner margin and 6 on the outer margin. Mid- and hind-femora with strong genicular spines.

Total length 4·1 mm.

This does not appear to correspond with any of the species figured by Germar and Berendt. The dorsal surface is marked by silvery streaks, due to the air entangled in the pubescence.

Holocompsa fossilis, sp. n. (Pl. 48. fig. 22.)

♂. No. *5452*.

Castaneous. Eyes reniform, wide apart. Antennæ slender, about equal to the total length of the insect, not ciliated, apical joints moniliform. Vertex of head projecting considerably beyond the pronotum, which is trapezoidal, posteriorly truncate, and provided with an erect pubescence, sides deflexed. Scutellum exposed. Tegmina exceeding the apex of the abdomen; the mediastinal and anal fields, the basal two-thirds of the marginal field, and the extreme base of the discoidal field opaque, castaneous; the remainder of the tegmina hyaline. A sub-hyaline spot between the anal field and marginal field. The opaque part of the tegmina with a delicate recumbent pubescence. Veins very slender, about 7 or 8 costals, radial vein ramose at apex, about 9 discoidal oblique sectors, anal vein strongly angled. Wings with a prominent stigma on the anterior margin, formed by the incrassated rami of the mediastinal vein and by the fusion of some of the costal veins; rami of ulnar vein numerous, flexuose. Supra-anal lamina transverse, sub-bilobate; sub-genital lamina more produced, posteriorly emarginate, and with two slender styles. Cerci slender and rather elongate, with 9 joints. Legs and abdomen beneath rufous. Genicular spines on all the femora. Tibial spines stout.

Total length 7·1 mm.; length of tegmina 5·5 mm.

The single specimen is in an admirable state of preservation and is certainly the gem of the whole collection. By great good chance the right tegmen stands out at a considerable angle to the body, revealing perfectly the structure of the wing beneath. The species is undoubtedly most closely allied to the recent *H. minutissima*, de Geer, from Surinam.

Larval Forms.

A large part of the collection is made up of immature forms and moults. The latter were doubtless left adhering to the bark of the trees whence the resin exuded, and became enclosed in it. All but three of the species enumerated below belong to the subfamily Phyllodromiinæ, and I find it impossible to allocate any of them with certainty to any of the adult forms that I have described. Germar and Berendt figure four distinct forms, which they merely label A, B, C, D. The second of these is the only one that I can identify with certainty.

? Phyllodromia sp. (Larva B.)

Germar and Berendt, op. cit. pl. 4. fig. 3 B.

Nos. 5426, 5430, 5438, 5442, 5448, 5453, 5459, 5464, 5466, 5467, 5471, 5478, 5488, 5492, 5510, 5512, 5524, 5532, 5546, 5555, 6707, 6720, 6728, 6739, 6741.

I hoped to be able to identify this very abundant species with the equally abundant *P. lorenz-meyeri*, but the front femora are completely spined on the anterior margin beneath, and therefore the larvæ cannot belong to that species. The thoracic tergites are bordered laterally and in some examples posteriorly also with rufous. The third joint of the antennæ is very long, equal in length to about six of the succeeding joints. The body is provided with a sparse erect pubescence. The supra-anal lamina is triangular, and the sub-genital lamina of the older examples of the male sex is slightly asymmetrical and furnished with 2 styles. Superficially this larva bears a close resemblance to larvæ of the recent species *Loboptera nitida*, Germ.

? Phyllodromia sp.

Polyzosteria tricuspidata, Germar & Berendt, op. cit. p. 35, pl. 4. fig. 1 (1856).

Nos. 5431, 5443, 5517, 6718.

These larvæ certainly do not belong to the genus *Polyzosteria* as now defined.

The following are very young larvæ, which it is not possible to refer to any of the species described above:—

Nos. 5485, 5499, 5506, 5514, 5516, 5518, 5526, 5536, 5541, 5550, 5552, 5553, 5559, 6725, 6727, 6729, 6733, 6736, 6737, 6738, 6742, α 3.

All of the above belong to the section Blattæ armatæ, but the following are Blattæ muticæ:—

No. 5435. Apparently identical with *Polyzosteria parvula*, Berendt (Ann. Soc. Ent. France, vol. v. p. 542, pl. 16. fig. 1 (1836); Germar & Berendt, op. cit. p. 35, pl. iv. fig. 2 (1856)). The species, of course, is not a *Polyzosteria*.

No. 6716. A larval moult. The supra-anal lamina is triangular, the sub-

genital lamina is furnished with minute styles ; the genicular spines are long, and arolia are present between the tarsal claws.

No. 6735 (Pl. 48. fig. 23) is another very young larva which probably should be referred to the subfamily Perisphæriinæ. Since the species is more distinctive than any of the others enumerated above, it should be recognisable from the following description and figure, and eventually it may be possible to assign it to some adult form as yet undiscovered.

♂. Depressed, ovate, rufo-testaceous, without pubescence. Head completely concealed beneath the pronotum ; eyes moderate, (?) approximated on vertex of head * ; antennæ short, with 18 joints. Pronotum sub-cucullate, anteriorly parabolic, posteriorly truncate, a faint median sulcus extending on to the mesonotum. Posterior angles of the meso- and metanotum slightly produced backwards, those of the abdominal tergites more strongly produced. Supra-anal lamina subquadrate, posteriorly slightly emarginate, barely exceeding the sub-genital lamina, which is trapezoidal and furnished with two minute styles. Lateral margins of abdominal sternites overlapped by the tergites. Cerci very small, unjointed, and pointed. Legs short ; femora unarmed beneath, their genicular spines minute ; posterior tibiæ with the spines on the outer aspect triseriately arranged, with an interior calcar almost equalling in length the metatarsus. All the metatarsi much shorter than the succeeding joints, their pulvilli and arolia large.

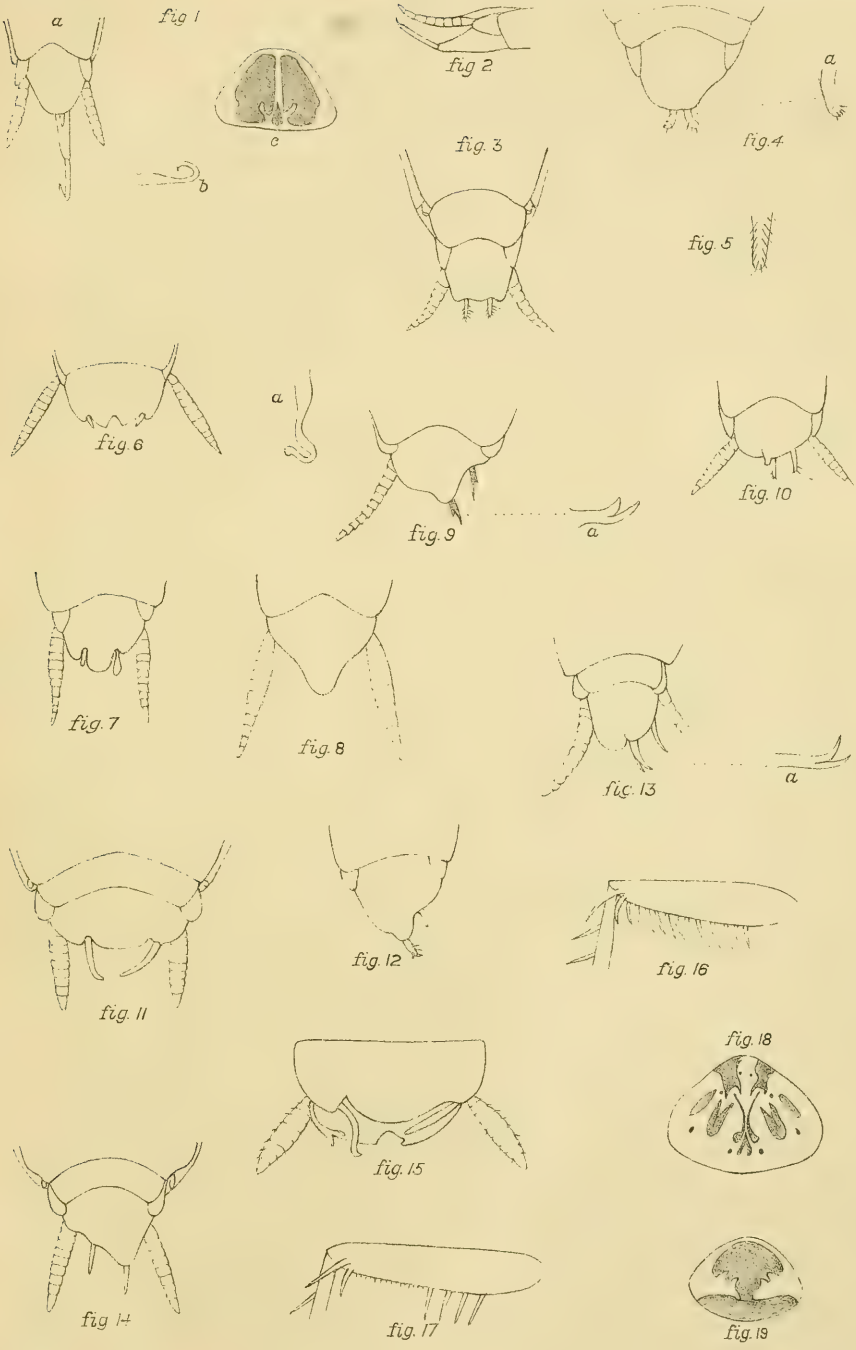
Total length 5·5 mm. ; greatest breadth 3·5 mm.

EXPLANATION OF THE PLATES.

Plate 47.

Fig. 1. *Ectobius balticus*, Germ. & Ber. *a*, apex of abdomen of male from beneath ; *b*, titillator penis ; *c*, pronotal pattern of specimen No. 5428.
2. *Ectobius inclusus*, sp. n., apex of abdomen of male from the side.
3. *Ischnoptera gedanensis*, Germ. & Ber., apex of abdomen of male from beneath.
4. *Ischnoptera klebsi*, sp. n., apex of abdomen of male from beneath. *a*, genital style.
5. Left genital style of *Ischnoptera perplexa*, sp. n.
6. *Phyllodromia lorenz-meyeri*, sp. n., apex of abdomen of male from beneath. *a*, titillator penis.
7. *Phyllodromia germari*, sp. n., apex of abdomen of male from beneath.
8. „ „ „ „ female from beneath.
9. *Phyllodromia yolanda*, sp. n., apex of abdomen of male from beneath.
10. *Phyllodromia antiqua*, sp. n., „ „ „ „
11. *Phyllodromia latissima*, sp. n., „ „ „ „
12. *Phyllodromia tenacula*, sp. n., „ „ „ „

* This detail cannot be made out very clearly.



R S Del

J.T. Rennie Reid, Lith. Edin.

BLATTIDAE IN AMBER.

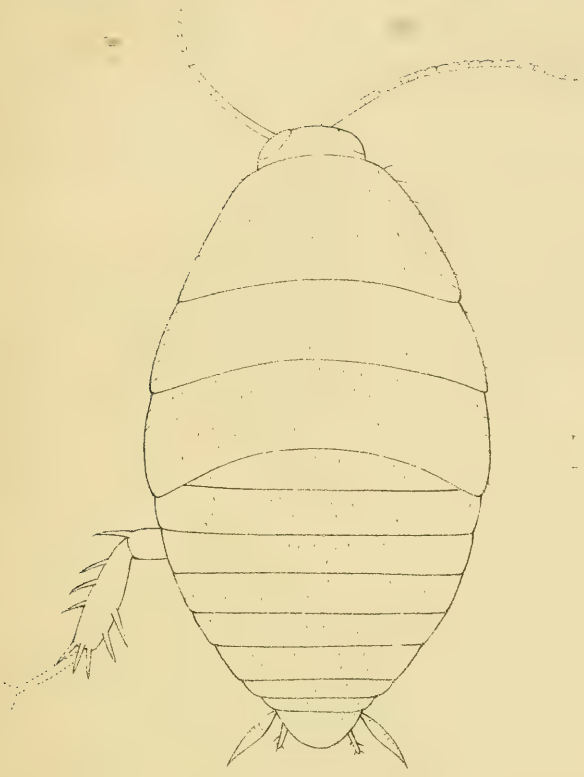


fig. 21

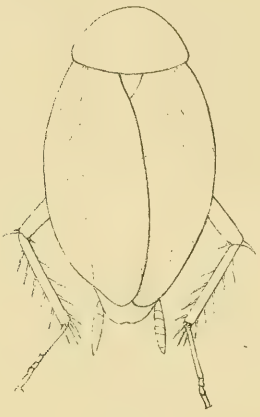


fig. 22

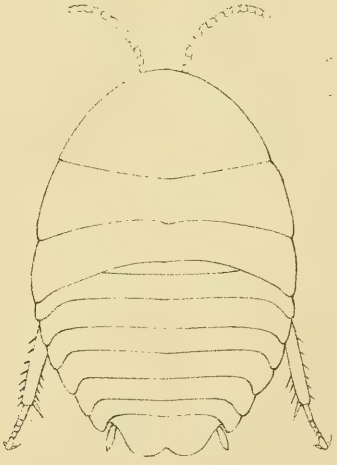


fig. 23

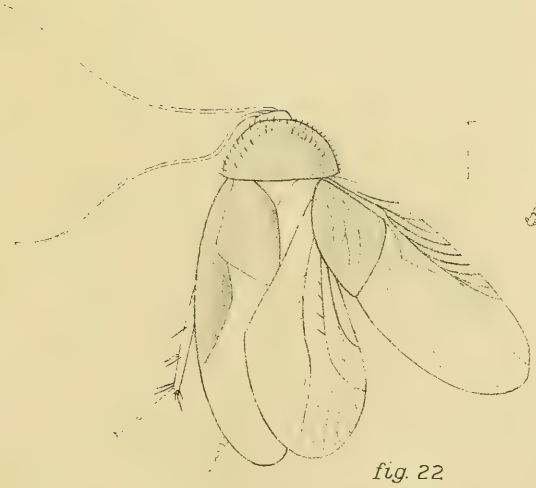


fig. 22

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J.T. Rennie Reid, Lith. Edin.

BLATTIDAE IN AMBER

Fig. 13. *Phyllodromia furcifera*, sp. n., apex of abdomen of male from beneath. *a*, genital style.
14. *Phyllodromia baltica*, sp. n., apex of abdomen of male from beneath.
15. *Phyllodromia klebsi*, sp. n., „ „ „ „
16. Front femur of *Phyllodromia antiqua*, ventral aspect.
17. „ *Phyllodromia lorenz-meyeri*, ventral aspect.
18. Pronotal pattern of *Phyllodromia germari*.
19. „ „ *Phyllodromia pristina*, sp. n.

PLATE 48.

Fig. 20. *Ceratinoptera cruenta*, sp. n. ♀.
21. *Polyphaga fossilis*, sp. n. ♂ larva.
22. *Holocompsa fossilis*, sp. n. ♂.
23. Perisphæriine larva.

On the new Tipulid Subfamily CERATOCHEILINÆ.

By W. WESCHÉ, F.R.M.S. (Communicated by JOHN HOPKINSON, F.L.S.)

(PLATE 49.)

[Read 18th November, 1909.]

IN 1903 the Linnean Society honoured me by publishing a number of observations on rudimentary—or, rather, vestigial—maxillary palpi in various Muscidæ.

From West Africa has now appeared a small group of the older Nematocerous Tipulidæ, the species of which have been found by two collectors in Southern Nigeria and Ashanti, with the labial palpi developed, and, contrary to the rule in all known Tipulidæ, the maxillary aborted. I now propose to describe this remarkable subfamily, as it presents fresh evidence that the thesis formulated in the former paper, that the single pair of developed palpi found throughout Diptera are not homologous, is correct.

While in Southern Nigeria, Lt.-Col. F. Winn Sampson made a number of preparations of insects for the purpose of studying the hair-structure. Among them were three, mounted whole without pressure, of a small Tipulid which carried remarkable bifid hairs on the legs. When examining these, I noticed that not only were the flies remarkable for the hair-structure, but that they had many other peculiarities. The mouth-parts were far removed from the normal Tipulid type, and differed in most respects from the specialized type found in *Geranomyia*. The venation differed, and later on was seen to be in an unsettled condition ; and the antennæ were quite characteristic, and also presented abnormalities, as the male appeared in one species to have eight joints, and the female eleven.